NOTES ON AMERICAN NEMESTRINIDAE, SECOND PAPER

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Subfamily **Nemestrininae**

Neorhynchocephalus Lichtwardt, 1909

The discussion of this genus in my earlier paper (1930, Psyche, XXXVII, pp. 286–289) followed common usage in regarding *Rhynchocephalus tauscheri* Fischer as the genotype of *Rhynchocephalus* Fischer. I have shown since (1932, Zool. Anz., C, p. 20) that this is erroneous. It had been overlooked that *Rhynchocephalus* was proposed by Fischer von Waldheim as a monotypic genus for *Rhynchocephalus caucasicus* Fischer, in the first edition of the "Mémoires de la Société Impériale des Naturalistes de Moscou" (vol. I), published in 1806. In the second edition of this same volume, which appeared in 1812 or 1813 (although the title-page is dated 1811), we find for the first time the description of *Rhynchocephalus tauscheri.* Obviously, the name *Rhynchocephalus* must be used for any group containing *R. caucasicus,* a species which is now placed in *Nemestrinus* Latreille. I have proposed retaining *Rhynchocephalus* for a subgenus containing species allied to *caucasicus.*

The next available name for the so-called "*Rhynchocephalus*" of authors is *Neorhynchocephalus* Lichtwardt, 1909 (genotype as designated by me in 1930: *Rhynchocephalus volaticus* Williston, 1883). After studying all the known species of this group, I feel there is no justification for separating, even subgenerically, the North American *N. volaticus* from the European *N. tauscheri.* I include both, as well as their relatives, in *Neorhynchocephalus,* as listed below. The distribution is conspicuously discontinuous; but it is noteworthy that as yet no species are known from South Africa and Australia.

1. *N. mendozanus* (Lichtwardt). South America.
2. *N. sackenii* (Williston). North America.

3. *N. sulphureus* (Wiedemann). South America.

4. *N. tauscheri* (Fischer) (=*Rhynchocephalus tauscheri* Fischer, 1812 or 1813; *Volucella taurica* Pallas, 1818; *Rhynchocephalus lativentris* Portschinsky, 1887). I have seen this species from southern Russia, northern Persia, the island of Rhodus, Tunis, and southern Spain.

5. *N. vitripennis* (Wiedemann). South America.

6. *N. volaticus* (Williston). North America.

The only reliable characters separating *Neorhynchocephalus* (as here delimited) from all species of *Nemestrinus* Latreille are the flattened or slightly convex face (in *Nemestrinus* always considerably swollen and often snout-like) and the long, sabre-shaped ovipositor of two slender curved valves (in *Nemestrinus* the ovipositor is telescope-shaped, of several retractile segments, the two terminal valves short and broad). Neither the venation of the wing, nor the direction assumed by the proboscis are diagnostic. Some species of *Nemestrinus* (of the subgenus *Rhynchocephalus* Fischer; type, *N. caucasicus*) have the venation exactly as in *N. volaticus*. In most specimens of *Neorhynchocephalus* the proboscis is either directed downward or slanting backward; but I have seen many specimens of *N. volaticus* in which it slants forward. On the other hand, I have seen examples of *Nemestrinus fasciatus* (Olivier), in which the proboscis is directed vertically downward. In *Neorhynchocephalus* the frons below the ocelli is always considerably narrower in the male than in the female; the eyes being almost holoptic in the males of certain species. Although in most species of *Nemestrinus* the frons is not conspicuously narrowed in the male, in others, such as *N. hirtus* Lichtwardt and *N. ruficaudis* (Lichtwardt), the frons of the male is relatively as narrow as in certain *Neorhynchocephalus*.

The following, revised key separates the six known species of *Neorhynchocephalus*.

1. Palearctic species. Base of fourth posterior cell broad, touching the anal cell over a long stretch, the lower margin running nearly parallel with the upper margin; diagonal vein as a rule not extending beyond the second and fourth posterior cells. Frons of female about half as wide at vertex as at insertion of antennæ; of male distinct below the ocelli where it is about one-eighth as wide as at antennæ. Fringes of pale yellow hairs forming distinct apical bands on the tergites of the abdomen. Length, 11 to 14 mm. .... *N. tauscheri* (Fischer).

American species. Base of fourth posterior cell either stalked or very narrow and barely touching the anal cell .... 2.

2. Two branches of fourth longitudinal vein as a rule united far from the costa, the second posterior cell closed and connected with the margin by means of a stalk (exceptionally closed just as margin or narrowly open); diagonal vein almost always extending beyond the second and fourth posterior cells, usually reaching the hind margin. Frons of female slightly narrowed above, about two-thirds as wide at vertex as at insertion of antennæ; linear below the ocelli in the male. Integument of abdomen wholly black. Length, 6 to 10 mm. (North America) .... *N. sackenii* (Williston).

Two branches of fourth longitudinal vein usually ending freely in the costa, some distance from each other (exceptionally meeting in one point; or upper branch of fourth united with lower branch of third, so that the first posterior cell is closed) .... 3.

3. North and Central American species. Body covered with pale yellowish pile; abdomen black or blotched more or less extensively with yellowish red; tergites with more or less distinct, white apical fringes; small tufts of black hair on the sides of third and fourth tergites .... 4.

South American species (south of the Equator). Legs uniformly pale colored, dirty yellow to reddish yellow. Abdominal tergites without distinct, white apical fringes .... 5.

4. Frons of female much narrowed above, about half as wide at vertex as at insertion of antennæ; of male linear, the inner orbits nearly touching over some length below the ocelli. Diagonal vein almost always extended beyond second and fourth posterior cells, usually reaching the hind margin. Legs pale yellowish to brownish, tibiæ and tarsi (especially of hind legs) darker than femora. Length, 8.5 to 14 mm. .... *N. volaticus* (Williston).

Frons of female slightly narrowed above, at vertex about five-sevenths of the width at insertion of antennæ. Diagonal vein extended only as a stump beyond second and fourth posterior cells, not reaching hind margin. Legs yellowish brown, femora mostly black. Length, 11 mm. (Male unknown) .... *N. mexicanus* J. Bequaert.

5. Diagonal vein not extending beyond the second and fourth posterior cells. Frons broad in both sexes; in the female scarcely narrowed toward the vertex where it is wider than an eye; in the male nearly two-thirds as wide below the ocelli as at the insertion of the antennæ; ocelli in a flattened triangle, the hind ocelli more than twice as far apart as their distance from inner orbits. Head, thorax, legs and abdomen densely covered with long, bright sulphur yellow pile; no or very few black hairs on the sides of the tergites. Length, 8 mm.
N. mendozanus (Lichtwardt).

Diagonal vein always extended beyond the second and fourth posterior cells, usually reaching the hind margin. Ocelli in an equilateral triangle in both sexes. Tufts of black hair on the sides of the abdominal tergites long and conspicuous ....6.

6. Female: Head, thorax and legs densely covered with long bright sulphur yellow pile; vertex with black hairs. Wings distinctly infuscated at the extreme base. Frons slightly narrowed toward the vertex where it is over three-fourths as wide as at the insertion of the antennæ; posterior ocelli about as far apart as their distance from inner orbits. Length, 8 to 10 mm. .... *N. sulphureus* (Wiedemann).

Male: Head, thorax and legs covered with pale yellowish or white pile; vertex with black hairs. Wings sub-hyaline throughout, at most slightly yellowish at the base. Frons narrowed but distinct below the ocelli, where it is about one-fourth as wide as at the insertion of the antennæ. Length, 8 to 11 mm. . . . *N. vitripennis* (Wiedemann).

Neorhynchocephalus volaticus (Williston)

Text Figure 1 *E–G*

See Psyche, 1930, XXXVII, p. 290. Additional references:

Rhynchocephalus volaticus Hunter, 1914, Kansas Univ. Sci. Bull., VIII (1913), p. 19. Curran, 1931, Canad. Entom., LXIII, pp. 69 and 72.

Rhynchocephalus maculatus Curran, 1931, *Ibidem,* LXIII, p. 69 (♂ ♀; type locality: Lawrence, Kansas; also from Sumner Co. and Waubaunsee Co., Kansas).

Rhynchocephalus flavus Curran, 1931, *Ibidem,* LXIII, pp. 69 and 70 (♂ ♀; type locality of male, holotype: Harper Co., Kansas; of female, allotype: Sumner Co., Kansas; also from Bourbon Co., Cherokee Co., and Waubaunsee Co., Kansas).

ADDITIONAL SPECIMEN; EXAMINED.—KANSAS: Atchison Co., forty-one males and thirty-three females (R. H. Beamer), and one male (D. A. Wilbur); Morris Co., twenty-eight males and forty-three females (R. H. Beamer); Medicine Lodge, Barber Co., two females and one male (G. P.Engelhardt); Leavenworth Co., one female (R. H. Beamer); Onaga, Pottawatomie Co., one male (R. H. Beamer); Riley Co., two males and one female (R. H. Beamer); Cowley Co., 1114 ft., one female (R. H. Beamer); Doniphan Co., two males and two females (R. H. Beamer); Saline Co., one male (R. H. Beamer); Dickinson Co., one female (L. C. Woodruff); Manhattan, Riley Co., seven males and five females (R. H. Painter); Pottawatomie Co., one female and one male (R. H. Painter).—OKLAHOMA: Arbuckle Mts., Murray Co., one male (R. H. Beamer).—FLORIDA: Sanford, Seminole Co., one female (R. H. Beamer); Wildwood, Sumter Co., fourteen males and eleven females (Paul W. Oman and R. H. Beamer).—MISSOURI: Hollister, Taney Co., one female (G. P. Engelhardt).—ARIZONA: San Diego Canyon on the west side of the Baboquivari Mts., 25 miles southeast of Sells, Pima Co., seven specimens, including a female emerged from a pupal skin, August 1, 1932 (R. H. Painter).—TEXAS: Kingsville, Kleberg Co., one female (F. M. Hull.—M.C.Z.).

The female from Mexico City recorded in my former paper under *N. volaticus* represents an apparently distinct species and is described below as *N. mexicanus*. The Mexican specimens from Presidio River, Venodio, State of Colima, Matamoros, and Chichen Itza (Yucatan) are, however, true *N. volaticus*.

The series of over 250 specimens, collected throughout the wide range of this species, shows conclusively that it is impossible to split up this species, even into varieties or geographical races, on the basis of the characters used by Curran to separate *volaticus*, *maculatus* and *flavus*. ''Paratypes'' of *maculatus* and *flavus* were sent to me by the author several years ago; but I was unable to see in them anything but the very variable *N. volaticus*, and the specimens were recorded under that name in my earlier paper. Both these ''new species'' were described from Kansas and, in one case, found in the same locality. The characters invoked to separate them in Curran's key are of the ''more-or-less'' type. In the species before me it is possible to select specimens that agree with either ''*maculatus*'' or ''*flavus*''; but there are many others that combine the characters of these so-called ''species.''

Of what he calls ''*volaticus*'' Curran saw only one female type from Florida (in the Williston Collection at Kansas Univ.).[1]

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[1] Williston described the species from two specimens and gave no more definite locality than ''Florida.'' Prof. H. B. Hungerford writes me that the type in Williston's collection is labelled ''Georgiana, Fla., Wm. Whitfeld,'' which is therefore the type locality. I agree with Curran that this specimen should be regarded as the holotype. The specimen marked as ''type'' at the U.S.N.M. may be the paratype, although it is only labelled ''Florida,'' while the same collection contains a specimen from Georgiana, not marked as type.

Over thirty specimens from four different localities in Florida (including the female from the type locality, Georgiana, at the U.S.N.M.), agree with specimens from Kansas, Texas, Mississippi, Mefflico, and Yucatan in the color of the pile of the second abdominal segment. The integument of the abdomen of the females of Kansas varies from wholly black to extensively reddish; and the difference in the color of the anterior four tarsi, whether "reddish" or "reddish brown" is of no practical value. If the pile of the second segment of the type of *volaticus* is actually as described by Curran ("tawny or fulvous with a reddish brown pilose band behind the middle"), it might well be abnormal, perhaps caused by some stain or dirt. At any rate, no other such specimen is known thus far, and until other specimens are collected in Florida showing this character of the type, I feel fully justified in my interpretation of *volaticus*.

N. volaticus is on the wing throughout June, July and the early part of August. The species is rather frequently seen mating. Professor R. H. Painter writes me that, in Kansas, he found most of his specimens hovering among fairly tall grass. On one occasion, in Pottawatomie Co., Kansas, a number were feeding at flowers of *Houstonia*.

The pupa found by Professor R. H. Painter, with a female emerging from it, is extremely similar to that of *Hirmoneura obscura* Wiedemann (as figured by Adam Handlirsch), of *H. exotica* Wiedemann (as seen by me at the Paris Museum), and of *Trichopsidea* (*Symmictus*) *costata* (Loew) (as figured by J. T. Potgieter, 1929, Science Bull. No. 82, Dept. of Agric., Union of South Africa, Fig. 6, *1b*). It is 25 mm. long and 5.5 mm. wide. Two slight protuberances are visible on the vertex, although they are not sharply pointed as in *H. obscura*. I can find no trace of the long protuberances ending in a curved hair, which are found on the face of the pupa of *H. obscura*; but the region between the antennal sheaths is markedly swollen. Smooth, shiny, protruding, coffee-bean-shaped spiracles protrude on each side at the limit between head and thorax, at the anterior margin of the first and about the middle of the second to seventh abdominal segments; the thoracic pair is briefly stalked, the abdominal spiracles are sessile. The abdominal segments 1 to 7 bear on each side, behind the spiracle, a transverse row of three very long, stiff setae, curved forward at their tips. In addition, dorsally and ventrally, each of these segments bears a transverse row of shorter and thinner setae placed in the posterior third on a slight ridge; many of these setae were evidently broken off while the pupa bored its way out of the soil. I can find no trace of setae on the eighth segment, but they may have been broken off on the dorsal and ventral side; certainly there are no curved setae on the sides. The ninth segment is divided into two long, conical, blunt, diverging protuberances, somewhat bent upward, but not forming hooks.

Professor R. H. Painter sends some interesting notes on finding this pupa: "I came upon this specimen about nine o'clock in the morning. The fly first attracted my attention as it was climbing up on a small weed. The wings had not yet spread and it evidently had come out of the pupa case which was lying on top of the ground just beneath the weed. The pupal case was only a foot or eighteen inches from the edge of a small stream which, I understand, was dry during a good share of the year. The locality which I have labeled '25 miles southeast of Sells, Ariz.' is in a small canyon locally known as San Diego Canyon, in the Baboquivari Mountains. The country about this locality is sparsely covered by scrub oak, mesquite, and various other chaparral plants. A few giant cacti were near by. Near the stream, the trees are somewhat larger and more plentiful. The specimen was placed in a bottle for the remainder of the morning to dry out."

Neorhynchocephalus sackenii (Williston)

See Psyche, 1930, XXXVII, p. 291. Additional references:

Neorhynchocephalus sackeni J. Bequaert, 1932, Zoolog. Anz., C, p. 33.

Rhynchocephalus sackeni Hunter, 1914, Kansas Univ. Sci. Bull., VIII (1913), p. 19. Robertson, 1928, Flowers and insects, p. 47. Curran, 1931, Canad. Entom., LXIII, pp. 69 and 72 (♀ ♂).

Rhynchocephalus subnitens Curran, 1931, Canad. Entom., LXIII, pp. 69 and 72 (♀).

ADDITIONAL SPECIMENS EXAMINED.—MICHIGAN: Douglas Lake, Cheboygan Co., one male (Charles Martin).—UTAH: Mt. Buncombe near Logan, Cache Co., 10,000 ft., one female (D. G. Hall).—OKLAHOMA: Lawton, Comanche Co., one male (R. H. Painter).—KANSAS: Manhattan, Riley Co., one female (R. H. Painter); Medora, Reno Co., sand hills, one male and one female (R. H. Beamer); Kiowa Co., one female (C. H. Martin); Scott Co., two males and three females (R. H. Beamer); Cheyenne Co., one male and one female (R. H. Beamer); Norton Co., one female (R. H. Beamer); McPherson Co., one female (R. H. Beamer).—ARKANSAS: Springdale, Washington Co., one female (F. M. Hull).—WASHINGTON STATE: Spanaway, Pierce Co., one female (J. Wilcox).—Mr. J. Wilcox writes me that he saw also specimens from Roy, Pierce Co., Washington; Corvallis, Oregon; and Salem, Marion Co., Oregon.—The holotype (♀) is in the Williston Collection at Kansas University.

Curran believes that *sackenii* and *subnitens* are distinguishable by the color of the hind femora and tarsi and of the style of the female. Unfortunately he does not mention the locality of the four females which he refers to *subnitens* (originally described from Kansas).[2] In the series from Kansas now before me, I find specimens that agree in these characters with some I have seen from Oregon and British Columbia.

Graham's (1932) discussion of the variation in color of the posterior tarsi and antennal style in *N. sackenii* must be disregarded, since, with one exception, all the specimens he studied were not that species, but *Trichopsidea* (*Parasymmictus*) *clausa* (Osten Sacken), as will be shown in the sequel. In my material of *N. sackenii* I find specimens with mostly black hind femora, others with the femora wholly yellowish, and some in which they are blackish in the basal half, yellowish apically; even in the darkest specimens the femora are never completely black.

Of the thirteen specimens listed above, eleven have the third submarginal cell broadly open at margin and the second posterior closed and stalked, as figured by Williston for the type. In one female from Scott Co., the right wing is normal; but in the left wing the second posterior cell is narrowly open at the margin. One male from Cheyenne Co. has the second posterior cell normally stalked in both wings; but, in addition, the third submarginal cell in the left wing is considerably narrowed over its apical third, while in the right wing it ends in a long stalk.

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[2] Mr. Curran writes me he believes these specimens were from Colorado.

Professor R. H. Beamer observed a female of *N. sackenii* in Scott Co., Kansas, for a half hour ovipositing in worm holes in dead Yucca. He found many eggs, which he says were in a loose mass, not adhesive. Most of the *N. sackenii* and *N. volaticus* were taken by him in meadows while hovering over flowers. It would be interesting to have a list made of the flowers visited by these flies. The only published flower record I can find is that by Robertson (1928), who took *N. sackenii* at *Achillea millefolium,* at Carlinville, Illinois.

Neorhynchocephalus mexicanus, new species

Text Figure 1 A–D

Female.—Medium-sized fly, similar in appearance to *N. volaticus.* Integument of body black. Antennæ, labrum and maxillæ of proboscis, halteres, coxæ, tibiæ and tarsi yellowish to clove brown; antennal style and apical segments of mid and hind tarsi somewhat infuscate; femora black, passing to yellowish brown in the apical fourth; apical half of claws black, basal half and pulvilli yellowish brown.

Body densely pilose, but more so ventrally than dorsally. Vertex and upper half of frons with a mixture of black and white erect hairs; remainder of head(including the beard) with white pile. Eyes bare. Dorsum of thorax mostly rubbed; the remaining hairs long, erect, pale yellowish; those at hind margin of scutellum partly black; pleura and pectus densely covered with long, erect, grayish white pile. Abdomen: first and second tergites mostly covered with long, erect, pale yellowish pile, shorter and somewhat matted down or curved back into indistinct fringes on the apical margins; on the following tergites the pile is much shorter, brighter yellow and appressed at the base as well as at the apical margin of each tergite, giving the abdomen a banded appearance; in the holotype the longer, erect pilosity of the third and succeeding tergites is very sparse (perhaps partly rubbed); extreme sides of third and fourth tergites with a small tuft of long, erect, black hairs close to base; venter completely covered with very dense, long, pale yellow, appressed hairs. The integument is entirely covered with a dull, ashy-gray pruinosity, except on the dorsum of the abdomen which is shiny.

Head (Fig. 1*C*) much flattened, much broader than the thorax, semi-elliptical in profile and from above; kidney-shaped seen in front, the height about two-thirds of the width. Frons flat and wide; inner orbits slightly converging from the insertion of the antennæ (where the frons is about as wide as an eye) to the occiput (where the frons measures about five-sevenths of the width at the antennæ). Ocellar protuberance low, flat, set off by saddle-like depressions from the inner orbits; ocelli placed in an equilateral triangle, the posterior ocelli about as far apart as their distance from the inner orbits (Fig. 1*B*). Antennæ very short (Fig. 1*D*), placed on the sides of the face a short distance from the lower orbits; basal segment slightly broader than long, truncate at apex; second slightly shorter and narrower than first; third from above subglobular and scarcely attenuated apically,

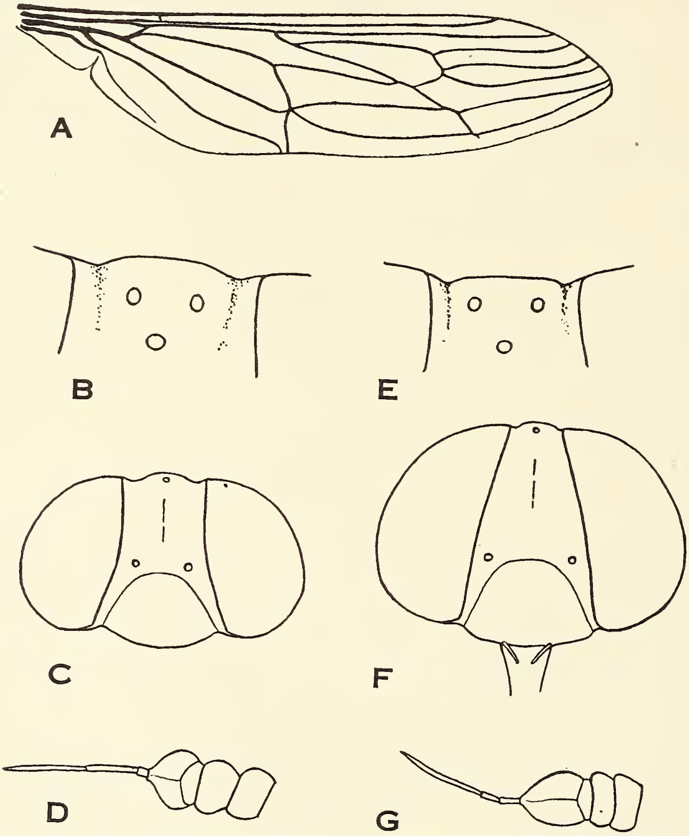

FIG. 1. *A–D*, *Neorhynchocephalus mexicanus* J. Bequaert, female: *A*, wing; *B*, vertex from above; *C*, head in front view; *D*, antenna. *E–G*, *volaticus* (Williston): *E*, vertex from above; *F*, head in front view; *G*, antenna.

somewhat flattened in profile, on the under side with a basal, transverse and a median, longitudinal groove; style short but decidedly longer than the antenna, three-jointed, the basal division very short, the second division about the length of the third. Face scarcely swollen, with a slight, median, longitudinal groove. Proboscis of medium length (flattened against pectus in holotype, the labella reaching barely beyond the hind coxæ), about one and one-third times the height of the head. Palpi short and very slender. Body very broad and thickset, somewhat flattened dorso-ventrally. Thorax distinctly broader than thick; dorsum slightly longer than wide; transverse suture marked on the sides over about one-fourth of the width of the dorsum. Scutellum large, semi-elliptical, cushion-shaped; the swollen hind margin sharply set off by a transverse, curved groove. Abdomen broad and convex dorsally, flattened ventrally. Valves of sabre-shaped ovipositor very narrow, barely widened apically, with bluntly rounded apex. Legs moderately long and stout; femora very slightly and gradually swollen in the basal two-thirds.

Wings about as long as the body, nearly four times as long as wide, hyaline throughout; veins pale yellowish brown. Venation (Fig. 1*A*) similar to that of *N. volaticus;* anal, second basal, discal, and fourth and fifth posterior cells all connected at one point; two branches of fourth longitudinal vein (M_1 and M_2) ending separately in costa, though quite close together (in right wing; left wing broken in holotype); costa very thin and in places absent along hind margin; diagonal vein not reaching hind margin, forming a very short stump beyond the lower margins of second and fourth posterior cells.

Length (not including ovipositor), 11 mm.; greatest width of abdomen, 6 mm.; length of labrum of proboscis, 3.5 mm.; length of wing, 11 mm.; width of wing, 2.8 mm.

Holotype female, Mexico City, MEXICO, August, 1918 (Juan Muller Collector.—U. S. National Museum).

This specimen was recorded in my former paper as *N. volaticus,* as it resembles that species exceedingly. However, in all the many females of *N. volaticus* I have seen the head is higher (height nearly three-quarters of the width, seen in front) and the frons is considerably narrowed toward the vertex, being there only about half as wide as at insertion of antennae (Fig. 1*E–F*); as a result the posterior ocelli are farther apart than their distance from the inner orbits. Whether the other differences mentioned in the key will stand after study of additional specimens of *N. mexicanus,* remains to be seen.

Neorhynchocephalus vitripennis (Wiedemann)

See Psyche, 1930, XXXVII, p. 294. Additional reference:

Neorhynchocephalus vitripennis J. Bequaert, 1932, Zoolog. Anz., C, p. 33 (♂).

ADDITIONAL SPECIMENS EXAMINED.—Two males, Bompland, Misiones Terr., ARGENTINA, January 13–14, 1927 (F. and M. Edwards.—British Museum).

I am by no means convinced that *vitripennis* and *sulphureus* are distinct species. It is rather puzzling that the four specimens I have seen of *sulphureus* are females, while the four specimens which agree with the description of *vitripennis* are all males. A large collection of both sexes from one locality could readily solve this problem.

Neorhynchocephalus sulphureus (Wiedemann)

See Psyche, XXXVII, 1930, p. 294. Additional reference:

Neorhynchocephalus sulphureus Lichtwardt, 1910, Ann. Mus. Nat. Hungarici, XVIII, p. 278.

ADDITIONAL SPECIMENS EXAMINED.—One female, ARGENTINA, 1904 (O. W. Thomas.—British Museum). One female, Estacion Araoz, Tucuman, ARGENTINA, January 8, 1927 (R. C. Shannon).

As indicated above, this is possibly not distinct from *N. vitripennis.*

Neorhynchocephalus mendozanus (Lichtwardt)

Rhynchocephalus mendozanus Lichtwardt, 1910, Deutsch. Ent. Zeitschr., p. 594 (♀♂; Mendoza Province, Argentina). Stuardo, 1930, Rev. Chilena Hist. Nat., XXXIV, p. 379 (♀♂) (*Ibidem,* XXXIII (1929), 1930, p. 162, fig. 30; without specific name).

SPECIMENS EXAMINED.—One female, Vila Ana, F. C. S. Fe, ARGENTINA, January, 1926 (K. J. Hayward.—British Museum). One male, Las Mercedes, Province Talca, CHILE (F. Ruiz.—Received from Professor C. Stuardo O.). One female, Angol, CHILE, November 23, 1931 (D. S. Bullock.—U.S.N.M.). One female, Colchagua Province, Chile (Edw. P. Reed).

These specimens have the wing venation exactly as figured by Professor Stuardo.

Subfamily **Hirmoneurinae**

Hirmoneura exotica Wiedemann

Hirmoneura exotica Wiedemann, 1824, Analecta Entom., p. 20 (♀; Montevideo, Uruguay); 1828, Aussereurop. Zweifl. Ins., I, p. 245 (♀). Latreille, 1825, Encyclop. Méthod., Insectes, X, p. 676. Macquart, 1834, Hist. Nat. Ins. Dipt., I,

p. 413 (♀). F. Lynch Arribalzage, 1878, Natural. Argent., I, p. 274. Brauer, 1883, Denkschr. Ak. Wiss. Wien, Math. Naturw. Kl., XLVII, Abt. 1, p. 26. Osten-Sacken, 1883, Wien. Ent. Zeitg., II, p. 114. Brèthes, 1907, An. Mus. Nac. Buenos Aires, XVI, p. 285. Lichtwardt, 1909, Deutsch. Ent. Zeitschr., p. 595 (♀). Bruch, 1917, Physis, III, p. 427, figs. 1–3 (♀). J. Bequaert, 1932, Zoolog. Anz., C. p. 16 (♀♂).

Hermoneura exotica Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 150. Kertész, 1909, Cat. Dipt., IV, p. 26.

SPECIMENS EXAMINED.—Two females in the V. v. Röder Collection, one labelled "Uruguay," the other "Brasilia." One female and one male taken *in copula,* Las Piedras near Montevideo, URUGUAY, January 19, 1903 (M. J. Nicoll.—Crawford Exp., British Museum). One female, La Plata, Prov. Buenos Aires, ARGENTINA, January 27, 1920, "en el patio de casa" (C. Bruch.—Shannon Coll.).

Whether this species actually occurs within the present political boundaries of Brazil is open to question. During the early quarter of the nineteenth century, the boundaries between Uruguay and Brazil were rather vague. The species appears to be common in northern Argentine and Uruguay.

This species belongs in the same group as the genotype, *H. obscura* Wiedemann, of Europe. First and second submarginal cells confluent (no cross-vein connecting second longitudinal vein and upper branch of third); no supernumerary cross-veins in the third submarginal and first and second posterior cells; alula well developed, very broad. Eyes pubescent, though with much shorter hairs than in *H. obscura*; distinctly separated in both sexes by a rather narrow frons. The species is well-known, but I have not found a description of the male.

Male (*undescribed*).—Agreeing in practically every respect with the female. Frons much narrower above, although distinctly separating the eyes; in the upper half it is nearly parallel-sided and measures at its narrowest point a little over one-third of its width at the antennæ; the inner orbits strongly divergent in the lower half of the frons (in the female, the inner orbits are very slightly diverging, the width of the frons at the antennæ being only about one and one-half times that of the upper part). Ocellar triangle slightly shorter than in the female. I find no appreciable difference in the shape of the palpi. Hypopygium small, inconspicuous.

The allotype is the male, at the British Museum, from Las Piedras near Montevideo, taken *in copula.*

H. exotica is one of the very few Nemestrinidae of which the life history is known to some extent. Carlos Bruch (1917) observed it ovipositing in deserted galleries of wood-boring insects in old fence posts. The eggs are laid fairly far inside, in groups, side by side. The further fate of the eggs was not observed. Many years ago, F. Lynch Arribalzaga (1878) claimed that *H. exotica* oviposits in the nests of a carpenter bee (*Xylocopa*); but, according to Bruch, there is no proof that this fly is a parasite of *Xylocopa,* although it may occasionally oviposit in empty burrows made by that bee. I have seen at the Paris Museum a beautiful pupal case of a *Hirmoneura* (most probably *H. exotica*) collected at Flores, Argentina, by Künckel d'Herculais. I am not aware that this entomologist ever published his observations on this insect. The pupa shows only minor differences from that of the European *H. obscura* Wiedemann.

Hirmoneura (Neohirmoneura) flavipes Williston

Hirmoneura flavipes Williston, 1886, Trans. Amer. Ent. Soc., XIII, p. 292 (♀; United States, without more definite locality). C. W. Johnson, 1895, Proc. Ac. Nat. Sci. Philadelphia, XLVII, p. 325. Aldrich, 1905, Cat. North Amer. Dipt., p. 218. Cockerell, 1908, Trans. Amer. Ent. Soc., XXXIV, pp. 251 and 252; 1910, Bull. Amer. Mus. Nat. Hist., XXVIII, p. 286. Lichtwardt, 1910, Deutsch. Ent. Zeitschr., p. 589. C. Schaeffer, 1912, Jl. New York Ent. Soc., XX, p. 296. C. W. Johnson, 1913, Bull. Amer. Mus. Nat. Hist., XXXII, p. 54. Hunter, 1914, Kansas Univ. Sci. Bull., VIII (1913), p. 19.

Hermoneura flavipes Kertész, 1909, Cat. Dipt., IV, p. 26.

Hirmoneura (*Neohirmoneura*) *flavipes* J. Bequaert, 1920, Jl. New York Ent. Soc., XXVII (1919), p. 306 (♀♂).

SPECIMENS EXAMINED.—ARIZONA: Pinery Canyon, Chiricahua Mts., Cochise Co., 6,500 ft., one female, June 2, 1919 (Ac. Nat. Sci. Phila.); Post Creek Canyon, Pinaleno Mts., Fort Grant, Graham Co., 6,000 ft., one female, July 18, 1917 (R. C. Shannon); Huachuca Mts., Cochise Co., one male, allotype (C. Schaeffer).

The two females from Arizona fit Williston's excellent description to a nicety. The most characteristic feature of the species is the conspicuous cross-band of grayish-white pollen at the base of the second tergite, followed by a wider shiny black band, the posterior half of the tergite being covered with dull, yellowish brown pollen. On the following tergites, the short hairs are mostly yellowish gray, mixed with a few black ones. The female holotype, in the Williston Collection at Kansas University, bears no indication of locality, Professor H. B. Hungerford writes me. Johnson (1895 and 1913) included *H. flavipes* in his list of the Diptera of Florida, but without mention of a locality. It is not in his collection and I have never seen a specimen actually taken in Florida, where the occurrence of the species is open to question.

Male (*undescribed*).—Extremely similar to the female, the vertex and frons being about the same width in both sexes. Hind tarsi brownish yellow. A series of reddish brown spots on the sides of second, third and fourth tergites, largest on the second where they cover about one-fifth of the width of the tergite; sternites and hypopygium also pale yellowish-brown. (In the female the integument of the abdomen is uniformly black). Wings more hyaline than in female. Eyes bare.

Total length, 13 mm.; length of wing, 13 mm.; width of wing, 3 mm.

Hirmoneura (Neohirmoneura) psilotes Osten Sacken

Hirmoneura psilotes Osten Sacken, 1886, Biologia Centr.-Amer., Diptera, I, p. 74 (♀; Mexico). Aldrich, 1905; Cat. North Amer. Dipt., p. 218. Cockerell, 1908, Trans. Amer. Ent. Soc., XXXIV, pp. 251 and 252; 1910, Bull. Amer. Mus. Nat. Hist., XXVIII, p. 286. Lichtwardt, 1910, Deutsch. Ent. Zeitschr., p. 590.

Hermoneura psilotes Kertész, 1909, Cat. Dipt., IV, p. 27.

Hirmoneura (*Neohirmonueura*) *psilotes* J. Bequaert, 1920, Jl. New York Ent. Soc., XXVII (1919), p. 306 (♀).

SPECIMENS EXAMINED.—GUATEMALA: Two females, Pacayal near Pochuta, 1,000 m., February 10, 1931 (J. Bequaert).

Nothing much can be added to Osten Sacken's description, which is adequate in every respect. The species is exceedingly close to *H. flavipes* and I can detect no appreciable differences in structure. The two species may be differentiated by the color of the abdomen, which in *H. psilotes* is covered dorsally with a uniform brownish-yellow, dull pollen, with the faintest traces of darker cross-bands (the second tergite not conspicuously banded as in *H. flavipes*); posterior half of second and whole of third and fourth tergites beset with short, semi-erect black hairs only. The color of legs and antennae is much the same in the two species.

The two Guatemalan specimens were collected in the coffee-growing region on the Pacific slope of the central mountain range, in the morning hours (between 9 and 10 A. M.) along a roadway separating a cafetal from a pasture. One specimen was resting on a leaf of a coffee-bush, some 3 feet above the ground. The other was hovering at a height of 5 or 6 feet, among the branches of a low tree, making the high-pitched noise characteristic of all Nemestrinidae. A third specimen was seen, but escaped. The weather was bright, sunny and warm.

Hirmoneura (Hyrmophlaeba) texana Cockerell

Hirmoneura texana Cockerell, 1908, Trans. Amer. Ent. Soc., XXXIV, pp. 251 and 253 (♂; New Braunfels, Texas); 1910, Bull. Amer. Mus. Nat. Hist., XXVIII, p. 286. Lichtwardt, 1910, Deutsch. Ent. Zeitschr., p. 591.

Hirmoneura "B." Cockerell, 1908, Amer. Jl. Sci. (4), XXV, p. 311, fig. 1 (on p. 310).

Hyrmophlaeba texana J. Bequaert, 1920, Jl. New York Ent. Soc., XXVII (1919), p. 306.

SPECIMENS EXAMINED.—TEXAS: Helotes, Bexar Co., three males and three females, July 1, 1917 (J. Bequaert and R. C. Shannon); Nueces River, Uvalde Co., fifteen females and two males, one pair taken *in copula,* July 2, 1917 (J. Bequaert and J. C. Bradley); Sabinal River, Uvalde Co., one male, July 2, 1917 (J. Bequaert).—ARIZONA: Post Creek Canyon, Fort Grant in the Pinaleño Mts., Graham Co., five females, July 18, 1917 (J. Bequaert and R. C. Shannon).

Female (undescribed).—Integument of the body black, with the margins of the segments somewhat brownish or reddish, densely covered with ashy-gray pruinosity, more brownish on the dorsal face of the abdomen. Antennæ and palpi very dark brown or black; style black. Mouth-parts and legs pale yellowish brown; terminal segments of tarsi somewhat infuscated.

Body moderately hairy all over; the long pilosity of the dorsum of the abdomen very easily rubbed off and in most specimens almost entirely gone. Ocellar triangle and upper part of face with long, blackish hairs; lower part of face (near the mouth-parts), outer orbits, and occiput with white pilosity. Basal two segments of antennæ with long, erect, black hairs, more or less placed in tufts; third segment and style bare. Thorax entirely covered with long, white hairs, mixed with a few black ones along anterior margin of notum and on scutellum. Some long black hairs behind the base of each wing. First tergite of abdomen with similar long, white hairs. In well-preserved specimens the second, third and fourth tergites are mostly covered with erect, moderately long, black hairs which form more or less distinct tufts on the sides; in addition, each of these tergites bears a more or less distinct band of erect, white hairs at the base, also forming a tuft on each side; the sides of the abdomen thus bear alternating tufts of white and black hair; the basal band is most pronounced on the second tergite. (As noted above, this dorsal pilosity of the abdomen is often almost entirely rubbed off). Under side of abdomen with shorter, somewhat appressed, silvery white pilosity. Legs with white hairs; tarsi and hind tibiæ with many black hairs.

Head large, hemispherical in profile, very slightly wider than high, broader than the thorax. Frons extremely narrow, hardly over one-fifth the width of the eye at its broadest point near the insertion of the antennæ. Inner orbits gradually converging below, more rapidly above. The eyes practically touch each other along the inner orbits over the upper half of the frons, from below the anterior ocellus to midway its distance from the antennæ. The eyes are much more distinctly holoptic in this species than in *H. brevirostris*. Ocellar triangle flattened, about twice as long as wide at the vertex, not distinctly separated by a groove from the inner orbits. Eyes entirely covered with dense, erect, long, dark brown or black hairs. Antennæ small, crowded together; first segment about three times as long as the second, slightly swollen; second segment very short, transverse; third segment flattened, pear-shaped, much longer and broader than the second. Style much longer than the second and third antennal segments together. Body moderately broad; the structure of thorax, scutellum, abdomen and ovipositor as in *H. brevirostris*. Legs slender.

Wings long and comparatively narrow, about four times as long as wide, about the length of the body without the ovipositor; entirely hyaline. Costa distinctly developed along the entire hind margin and reached by the diagonal vein. The cross-vein which separates the first and second submarginal cells, reaches the third longitudinal beyond its branching. Third submarginal cell broadly truncate at the base and widely open at the apex on the costa. Anal cell broadly open.

Length (to apex of tergite 4): 9 to 11 mm.; length of wing: 10 to 11 mm.; width of wing: 2.7 to 3 mm.

The allotype is a female from Helotes, Texas (M. C. Z.).

Male.—Hardly different from the female, except in the secondary sexual peculiarities. The eyes are also holoptic and densely pilose. The pilosity of the abdomen is usually better preserved in the males than in the females.

Length: 11 mm.; length of wing, 10 mm.; width of wing, 2.8 mm.

Hirmoneura texana var. **arizonensis**, new variety

Male and Female.—Agree with typical *H. texana* in every detail of structure, color of integument and pilosity, but the wings are decidedly smoky throughout, slightly more toward the anterior margin. The size is the same as that of the typical form.

ARIZONA: San Diego Canyon on the west side of the Baboquivari Mts., 25 miles southeast of Sells, Pima Co., male holotype and fourteen male paratypes, August 2, 1932 (R. H. Painter.—Holotypes in Painter Collection; paratypes in the same collection and in that of the author); Pima Co., one male paratype, July 22, 1927 (R. H. Beamer.—Ks. Univ. Ent. Dept.); Baboquivari Mts., Pima Co., female allotype, one female paratype, and two male paratypes (F. H. Snow.—Ks. Univ. Ent. Dept.).

Professor Painter informs me that his specimens were all collected very early in the morning, before sunrise. I have made similar observations on typical *H. texana,* in Texas, during the Cornell Biological Expedition of 1917.

Subfamily **Trichopsideinae**

The Trichopsideinae are nemestrinids with the proboscis rudimentary or completely aborted. The palpi are either vestigial or well-developed, slender, and hidden in deep grooves on either side of the face. The venation is always rather simple, never reticulate. The alula of the wing is in most genera vestigial or absent (well-developed in *Nycterimyia* and *Ceyloniola*). The ovipositor of the female is long, sabre-shaped, composed of two slender, curved valves.

Of the five genera which I recognize in this subfamily, only one occurs in America.

Trichopsidea Westwood

Trichopsidea Westwood, 1839, Trans. Ent. Soc. London, II, pt. 3, p. 151 (monotypic for *Trichopsidea oestracea* Westwood, 1839).

Ocelli well-developed. Eyes bare, very broadly separated by frons and vertex in female, distinctly or very narrowly (barely) separated in the male. Third antennal segment bare or with very few hairs, the style slender or scarcely flattened. Wing of normal shape, not narrowed at the base; alula vestigial or absent; axillary cell of normal width, without additional axillary vein. Abdomen short and stubby. Legs normal, the femora and tibiae not appreciably swollen.

The four known species of *Trichopsidea* (as defined above) have thus far been placed in as many different genera. I have seen specimens of all. They are extremely similar in general appearance as well as in the essential structures. The characters separating them are slight and would be very unsatisfactory, were it not for the fact that each species occupies an area widely distant from the others. *T. oestracea* Westwood is found in Australia, Tasmania and New Guinea; *T. flavopilosa* (Bigot) occurs throughout the Mediterranean Subregion; *T. costata* (Loew) is South African; and *T. clausa* (Osten Sacken) is North American. The venation appears to be at least as variable as customary in the Nemestrinidae, so that the peculiarities used in the subjoined key are not of more than specific value. It seems questionable whether the names *Dicrotrypana* Bigot, *Symmictus* Loew, and *Parasymmictus* Bigot are worth retaining, even in a subgeneric sense.

1. North American species. Both third (R_{4+5}) and fourth (M_{1+2}) longitudinal veins divided into two branches which fuse far from the margin into a long stalk; second and third longitudinal veins connected by a cross-vein (three submarginal cells, the second open on the margin, the third closed; five posterior cells, the second closed). Eyes widely separated in both sexes, but the frons broader in the female. (Subgenus *Parasymmictus* Bigot) .... *T. clausa* (Osten Sacken).
   Old World species. Third longitudinal vein (R_{4+5}) not branched (two submarginal cells only) .... 2.
2. Australian and Papuan species. Third longitudinal vein ending freely in the margin, the second submarginal cell broadly open. Eyes widely separated in female, almost meeting below ocelli in male.
   T. oestracea Westwood.
   Third and fourth longitudinal veins fused some distance before the margin; the second submarginal cell closed and stalked at apex............3.
3. Species of the Mediterranean Subregion. Dorsum of thorax uniformly covered with yellowish pile. Frons about as wide as an eye in female;

in male much narrowed toward vertex, where the eyes almost meet below the ocelli. (Subgenus *Dicrotrypana* Bigot).
T. flavopilosa (Bigot).

South African species. Dorsum of thorax with two narrow, longitudinal, silvery-white stripes. Frons much wider than an eye in female; very narrow, though still present below the ocelli in male. (Subgenus *Symmictus* Loew) .... *T. costata* (Loew).

Trichopsidea (Parasymmictus) clausa (Osten Sacken)

Hirmoneura clàusa Osten Sacken, 1877, Bull. U. S. Geol. Survey, III, pt. 2, p. 225 (supposedly ♀, really ♂; Dallas, Texas); 1878, Smithson. Miscell. Coll., No. 270, pp. 85 and 237. Williston, 1883, Canad. Entom., XV, p. 70. Osten Sacken, 1898, Berlin. Ent. Zeitschr., XLII (1897), p. 148. Aldrich, 1905, Cat. North American Dipt., p. 218. Cockerell, 1908, Trans. Amer. Ent. Soc., XXXIV, p. 251; 1908, Amer. Jl. Sci. (4), XXV, p. 311, fig. (on p. 310).

Parasymmictus clausus Bigot, 1879, Ann. Soc. Ent. France (5), IX, Bull. Séances, p. lxvii; 1881, *Ibidem* (6), I, p. 15. Kertész, 1909, Cat. Dipt., IV, p. 31. Lichtwardt, 1910, Deutsch. Ent. Zeitschr., pp. 589 and 591. C. W. Johnson, 1913, Bull. Amer. Mus. Nat. Hist., XXXII, p. 54. J. Bequaert, 1920, Jl. New York Ent. Soc., XXVII (1919), p. 306. J. Comstock, 1924, Introduction to Entomology, p. 836, fig. 1077.

Hirmoneura (Parasymmictus) clausa Cockerell, 1910, Bull. Amer. Mus. Nat. Hist., XXVIII, p. 286.

Rhynchocephalus sackeni J. and A. Comstock, 1914, Manual Study of Insects, 12th Ed., p. 640, fig. 555. Spencer, 1931, Proc. Ent. Soc. Brit. Columbia, XXVIII, p. 21, figs.; 1932, *Ibidem,* XXIX, p. 25. Graham, 1932, Canad. Entom., LXIV, p. 167 (♀). Not of Williston.

Rhynchocephalus sp. J. Comstock, 1918, The Wings of Insects, p. 347, fig. 358.

SPECIMENS EXAMINED.—TEXAS: Dallas, male holotype (Boll. M.C.Z.); one female, without more definite locality (U. S. Nat. Mus.).—KANSAS: Medora, Reno Co., July 2, 1927, one male (L. D. Anderson.—Kansas Univ. Ent. Dept.).—FLORIDA: Beresford, Volusia Co., one male (G.D.H. in Coll. C. W. Johnson, now at M.C.Z.).—BRITISH COLUMBIA: Riske Creek, Chilcotin District, 51° 58′ N., 122° 30′ W., June 16, 1929, and June 9, 1931, ten females (G. J. Spencer); this appears to be the northernmost record of any species of Nemestrinidae; Chilcotin, June 11, 1920, one female (R. C. Treherne).

This unusually interesting and rare insect was the center of a controversy by Osten Sacken and Fr. Brauer (1883, Offenes Schreiben als Antwort auf Herrn Baron Osten Sacken's "Critical Review" meiner Arbeit über die Notacanthen. Vienna, pp. 8–9). Although the original description was clear enough, since it mentioned the peculiar wing venation and the aborted proboscis, Brauer was led to misidentify as this species six specimens from Colorado of *Neorhynchocephalus sackenii* (Williston). G. J. Spencer's and K. Graham's recent discussions of *N. sackenii* were based on a similar error of identification. The flies studied by these authors were *T.* (*P.*) *clausa* (Osten Sacken), as shown by specimens received from Professor Spencer. This explains Graham's finding in his series of 91 specimens, all except one, with the third submarginal cell (R_4) closed, for such is the normal condition in *T. clausa* and exceptional in *N. sackenii.*

In the fifteen specimens seen, the venation varies in many details, but the third submarginal and second posterior cells always end in a long stalk (in one female from Chilcotin, the second posterior cell is incomplete in the left wing, owing to the abnormal shortening of the lower branch of the fourth longitudinal vein). The third submarginal cell may be sessile, narrowly or broadly truncate, or stalked at the base. In the type there is an abnormal, supernumerary cross-vein in the first basal cell, placed close to the base in the right wing and about midway in the left wing. This is not present in any of the other specimens.

The well-developed frons of the male induced Osten Sacken to regard the type as "apparently a female," but it actually is a male. In the true female, readily recognizable by the sabre-shaped ovipositor (similar to that of *Neorhynchocephalus*), the frons is much wider than in the male, occupying at the vertex about one-half of the total width of the head and much more at the insertion of the antennae.

Spencer's (1931 and 1932) observations on oviposition, illustrated with three fine photographs, refer to *T.* (*P.*) *clausa,* not to *Neorhynchocephalus sackenii* (as shown above). At Riske Creek, in the Chilcotin, British Columbia, in June, 1929, 1930 and 1931, he observed many females of *T. clausa* laying eggs into cracks of weather-beaten telephone poles. The row of poles ran through an egg-bed of the grasshopper, *Camnula pellucida* Scudder. As many as thirty flies were assembled on a pole at once and the eggs were laid from 8 inches to 15 feet above the ground. Several females remained for over half an hour and one for nearly an hour in the ovipositing position. Misled by Williston's rather ambiguous statements about the known early stages of Nemestrinidae and by the occurrence in the poles of burrows made by cerambycid beetles, Spencer drew the inference that the larvae of *T. clausa* were parasitic upon the larvae of such beetles. This conclusion is, however, premature. Thus far the feeding habits of the larvae are known only for two species of Nemestrinidae. In Europe, the full-grown larva of *Hirmoneura obscura* Wiedemann has been found by Adam Handlirsch and F. Brauer in the pupae of a scarabeid beetle, *Rhizotrogus solstitialis,* which lives in the ground at roots (although *Hirmoneura obscura* oviposits in the old burrows made by wood-boring beetles in fences). In South Africa, the larva of *Trichopsidea* (*Symmictus*) *costata* (Loew) parasitizes the adults of the brown swarm grasshopper or locust, *Locustana pardalina* (the oviposition is unknown). From the very close relationship between *T. clausa* and *T. costata* and from the fact that grasshoppers were abundant in the area where Spenser made his observations, the surmise seems warranted that the larvae of *T. clausa* will eventually be found inside live grasshoppers. The early stage larva of *T. costata* possesses a conspicuous posterior tail, which, however, is shed shortly before the full-grown larva leaves the grasshopper and burrows into the soil to pupate.

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